

TAXONOMIC NOTES ON DUTCH DESMIIDS III

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ABSTRACT — From The Netherlands, six desmid taxa are newly described: *Staurastrum obscurum* sp. nov., *S. kouwetsii* sp. nov. (with zygospore), *S. minimum* sp. nov., *S. simonyi* Heimerl var. *semicirculare* var. nov., *S. micron* W. & G. S. West var. *spinulosum* var. nov. and *S. paradoxum* Meyen ex Ralfs var. *reductum* var. nov. Of seven taxa the names are recombined: *Staurastrum furcatum* (Ehr. ex Ralfs) Bréb. var. *aciculiferum* (W. West) comb. nov., *S. acutum* Bréb. var. *paxilliferum* (G. S. West) comb. nov., *S. acutum* Bréb. var. *badense* (Schmidle) comb. nov., *S. cristatum* (Näg.) Arch. var. *navigiolum* (Grönbl.) comb. nov., *S. controversum* Bréb. ex Ralfs var. *semivestitum* (W. West) comb. nov., *S. inflexum* Bréb. var. *brachycerum* (Bréb.) comb. nov. and *S. dispar* Bréb. var. *semicirculare* (Wittr.) comb. nov. The name of *Staurastrum cristatum* (Näg.) Arch. var. *cuneatum* Hinode is validated and the identity of *Staurastrum paradoxum* Meyen ex Ralfs is discussed.

RÉSUMÉ — Six nouveaux taxons appartenant à l'ordre des Desmidiales sont décrits des Pays Bas: *Staurastrum obscurum* sp. nov., *S. kouwetsii* sp. nov. (avec zygospore), *S. minimum* sp. nov., *S. simonyi* Heimerl var. *semicirculare* var. nov., *S. micron* W. & G. S. West var. *spinulosum* var. nov. et *S. paradoxum* Meyen ex Ralfs var. *reductum* var. nov. Pour sept taxons, les noms font l'objet d'une nouvelle combinaison: *Staurastrum furcatum* (Ehr. ex Ralfs) Bréb. var. *aciculiferum* (W. West) comb. nov., *S. acutum* Bréb. var. *paxilliferum* (G. S. West) comb. nov., *S. acutum* Bréb. var. *badense* (Schmidle) comb. nov., *S. cristatum* (Näg.) Arch. var. *navigiolum* (Grönbl.) comb. nov., *S. controversum* Bréb. ex Ralfs var. *semivestitum* (W. West) comb. nov., *S. inflexum* Bréb. var. *brachycerum* (Bréb.) comb. nov. et *S. dispar* Bréb. var. *semicirculare* (Wittr.) comb. nov. Le nom de *Staurastrum cristatum* (Näg.) Arch. var. *cuneatum* Hinode est validé et l'identité de *Staurastrum paradoxum* Meyen ex Ralfs est discutée.

KEY WORDS: taxonomy, desmids, *Staurastrum*, The Netherlands

INTRODUCTION

Just like on earlier occasions (Coesel, 1989, 1993) the preparation of a new part of the Dutch desmid flora (Coesel, 1982-1994) implies some preceding taxonomic revisions. This time they deal with the genus *Staurastrum*, see also Coesel (in press) and Coesel & Joosten (in press).

TAXONOMY

***Staurastrum acutum* Bréb. var. *badense* (Schmidle) comb. nov. (Figs. 3, 4.)**

Basionym: *S. varians* Rac. var. *badense* Schmidle 1894, p. 554, tab. 28: 16.

S. varians is a rather poorly-known species. The original description in Raciborski (1885, p. 86, tab. 12: 1) shows both bi-, tri- and quadriradiate cells, in top view always with convex sides. Var. *badense* Schmidle, differing from the nominal variety of *S. varians* by concave sides in apical view, in my opinion may better be classed under *S. acutum*.

So far, in The Netherlands, *S. acutum* var. *badense* is only known from the island of Ameland.

***Staurastrum acutum* Bréb. var. *paxilliferum* (G. S. West) comb. nov. (Fig. 2)**

Basionym: *S. paxilliferum* G. S. West 1899, p. 219, tab. 396: 8.

According to the well-known desmid flora by West & West (1912), *S. paxilliferum* should be compared with *S. granulosum* Ralfs, "with which it appears to have a very close affinity". When doing so, the close affinity in particular appears to hold for *S. granulosum* var. *acutum* (Bréb.) W. & G. S. West, rather than for the nominal variety of *S. granulosum*. Whereas *S. granulosum* var. *granulosum* in West & West (1912) is characterized by "obsemicircular" semicells, semicells in var. *acutum* are "elliptic-fusiform", with dorsal and ventral margins which are more equally convex than in var. *granulosum*. (see our Fig. 1). In view of this feature, to my mind, *S. acutum* has not to be classified under *S. granulosum*. On the other hand, the main difference between *S. acutum* and *S. paxilliferum* is in the size of the cell wall granules, these granules being more or less papilliform, so more pronounced, in *S. paxilliferum*. This rather subtle difference in my opinion does not justify discrimination at species level. So, *S. paxilliferum* is classified as a variety of *S. acutum*.

In The Netherlands, *S. acutum* var. *paxilliferum* was only encountered in a number of shallow mesotrophic fen hollows, whereas *S. acutum* var. *acutum* is known from some oligo-mesotrophic moorland pools.

***Staurastrum controversum* Bréb. ex Ralfs var. *semivestitum* (W. West) comb. nov. (Fig. 11)**

Basionym: *S. vestitum* Ralfs var. *semivestitum* W. West 1892a, p. 732, tab. 9: 38.

When observed in apical view var. *semivestitum*, with its processes all bent in one direction and with furcate spines emarginating in particular the convex side of each process, in essence resembles *S. controversum* rather than *S. vestitum* (see Fig. 12 and Fig. 10, respectively). For that matter, the affinity to *S. controversum* was also noticed by West *et al.* (1923, p. 160).

In The Netherlands, *S. controversum* (both its nominal variety and var. *semivestitum*) was encountered in a number of acid, oligotrophic moorland pools, mainly in the beginning of this century.

***Staurastrum cristatum* (Näg.) Arch. var. *cuneatum* Hinode ex Coesel (Fig. 13)**

Original description: Hinode 1967, p. 77, fig. 3: 6.

Lectotype: *ibid.*, fig. 3: 6.

Although Hinode (*loc. cit.*) provided just one single figure, so that it cannot give rise to any confusion as for the identity of the taxon described, he did not

designate a type (laid down in Art. 37 of I.C.B.N., Greuter *et al.*, 1994). By indicating a type herewith, the name in question is formally validated.

In The Netherlands, *S. cristatum* var. *cuneatum* is locally not rare in mesotrophic fen hollows.

***Staurastrum cristatum* (Näg.) Arch. var. *navigiolum* (Grönbl.) comb. nov. (Fig. 14)**

Basionym: *S. navigiolum* Grönblad 1920, p. 71, tab. 3: 95-97.

Grönblad (*loc. cit.*) compared his taxon with *S. pseudobiretum* Playf. and *S. papillosum* Kirchn. However, in my opinion, its relationship to *S. cristatum* is obvious (see also Skuja, 1934, f. 117).

In The Netherlands, this taxon is only known from a mesotrophic pool near Voorst.

***Staurastrum dispar* Bréb. var. *semicirculare* (Wittrock) comb. nov. (Fig. 16)**

Basionym: *S. hexacerum* (Ehr.) ex Wittrock 1872, p. 52, tab. 4: 9.

Species concepts of both *S. dispar* and *S. hexacerum* are pretty unclear, see West & West (1912, p. 187, tab. 127: 7) and West *et al.* (1923, p. 138, tab. 142: 11-14), respectively. However, when considering the diagnoses of these taxa as given by the Wests (*loc. cit.*) *S. hexacerum* is characterized by semicells that taper towards the angles to form (very) short processes, dorsal and ventral margins of the semicell body being about equally convex. In *S. dispar*, on the other hand, lateral angles are acutely rounded and the dorsal margin of the semicells is more convex than the ventral one.

In view of these differentiating characteristics, *S. hexacerum* var. *semicirculare* better can be transferred to *S. dispar* (compare our Fig. 15).

In The Netherlands, *S. dispar* var. *semicirculare* is only known from the island of Ameland, whereas the nominal variety of *S. dispar* is more widely distributed, occurring in mesotrophic pools and fen hollows.

***Staurastrum furcatum* (Ehr. ex Ralfs) Bréb. var. *aciculiferum* (W. West) comb. nov. (Figs. 32, 33)**

Basionym: *S. avicula* Bréb. in Ralfs var. *aciculiferum* W. West 1889, p. 293, tab. 291: 12.

Synonyms: *S. aciculiferum* (W. West) Andersson 1890, p. 11, tab. 1: 4. *S. spinosum* Bréb. in Ralfs var. *aciculiferum* (W. West) Péterfi 1973, p. 126.

The close relationship between *S. furcatum* (synonym: *S. spinosum*) and *S. aciculiferum* was stressed by Péterfi (1973) who figured some intermediate and dichotytic forms. Since Péterfi (*loc. cit.*) considered the epithet of *spinosum* to have priority over that of *furcatum* he classified the taxon *aciculiferum* as a variety of *S. spinosum*. However, Compère (1976) adduced arguments in support of the name of *S. furcatum* as the correct one. Since we are, like Péterfi, familiar with transitional forms, I herewith classify *S. aciculiferum* as a variety under *S. furcatum*.

In The Netherlands, both the nominal variety of *S. furcatum* (Fig. 31) and var. *aciculiferum* are not rare in acid, oligotrophic moorland pools.

***Staurastrum inflexum* Bréb. var. *brachycerum* (Bréb.) comb. nov. (Figs. 6-8)**

Basionym: *S. brachycerum* Brébisson 1856, p. 139, tab. 1: 24.

Brébisson (1856) when describing *S. inflexum* and *S. brachycerum* already stressed the high similarity between these two taxa. To my mind, the differences are

such slight (compare tab. I: 24 with tab. I: 25 in Brébisson, 1856, as well as our Fig. 5 with Figs. 6-8) that they do not justify discrimination at species level.

Whereas, in The Netherlands, the nominal variety of *S. inflexum* is a rather common taxon in all kinds of shallow fresh waters provided that they are not too acid or too alkaline; var. *brachycerum* is only known from the island of Schiermonnikoog.

Staurastrum kouwetsii sp. nov. (Figs. 18, 19)

Cellulae in aspectu frontali tam longi quam lati sunt, necnon habent profundam medianam constrictiōem. Sinus exhibit formam litterae V. Semicellulae habent formam ellipticam vel rhomboidēm. Parietis cellularum satis firmis spinis instructa est, ordinibus concentricis circum angulos dispositis. Cellulae in aspectu apicali triangulares sunt cum marginibus concavis et angulis arte rotundis, necnon circiter quinque concentris seriesibus spinarum super unumquemque trium radiorum. Centrum apicis planus est. Zygospora convexa est et firmis his bifurcatis spinis instructa. Dimensiones: cellularum longitudo — spinis exclusis — 36-43 µm, cellularum latitudo — spinis exclusis — 36-43 µm, isthmi latitudo 10-13 µm, longitudo spinarum 3-4 µm, zygospore diameter sine spinis circiter 40 µm, spinis inclusis circiter 75 µm. Typus: Fig. 18.

Cells in frontal view as long as broad, with a deep median constriction. Sinus v-shaped. Semicells elliptic-rhomboid. Cell wall provided with rather stout spines arranged in concentric series round the angles. Cells in apical view triangular with concave margins, narrowly rounded angles, and some five concentric series of spines across each of the three radii. Center of apex smooth. Zygospore spherical, provided with stout spines doubly bifurcate at the apex. Dimensions: cell length (exclusive of spines) 36-43 µm, cell breadth (exclusive of spines) 36-43 µm, breadth of isthmus 10-13 µm, length of spines 3-4 µm, zygospore diameter exclusive of spines ca. 40 µm, inclusive of spines ca. 75 µm. Type: Fig. 18.

Type locality: mesotrophic moorland pool near Staverden, collected May 1972 (collection no. 72. 132 Amsterdam herbarium).

Distribution: in The Netherlands only known from the type locality (encountered with zygospores in 1982). Also known (as *S. subbrebissonii* Schmidle) from the Auvergne, central France (Kouwets, 1987), Steiermark, Austria (Lenzenweger, 1984), Hiddensee, northern Germany (Ruzicka, 1972) and Berchtesgaden, southern Germany (Kaiser, 1924).

S. kouwetsii, usually wrongly labeled as *S. subbrebissonii* Schmidle (e. g. Coesel & Kooijman-Van Blokland, 1976), may be mixed up with *S. brebissonii* Arch., from which it is to be distinguished by stouter spines, positioned in a less dense pattern (compare Fig. 17).

The species is named after Dr Frans Kouwets, who presented this taxon (Kouwets, 1987, p. 253, tab. 17: 15-16) as “? *S. subbrebissonii* Schmidle” adding a critical consideration of all taxa supposed to be related.

Staurastrum micron W. ■ G. S. West var. *spinulosum* var. nov. (Figs. 24, 25)

Var. spinulosum differt a varietate eponymica ornamentatione parietis cellulae magis spinosa. In visu apicali unaquaque margo corporis semicellulae instructa est duabus eminentibus spinis. Typus: Fig. 24.

Var. *spinulosum* differs from the nominal variety by a more spinous cell wall ornamentation. In apical view, each margin of the semicell body is provided with two prominent spines.

The taxon under discussion presumably is identical to the algal form presented by Taylor (1935, p. 192, tab. 37: 3, 3a) under the name of "*S. heimerlianum* Lütken, f. (?)"'. In view of its bowl-shaped semicell body it is to be related to *S. micron* rather than to *S. heimerlianum*, the latter species being characterized by fusiform semicells (see West *et al.*, 1923, p. 165, tab. 149: 14-16).

In The Netherlands, the nominal variety of *S. micron* (Fig. 26) is not rare in oligo-mesotrophic moorland pools. Var. *spinulosum*, on the other hand, is only known from a pool near Ommen.

Staurastrum minimum sp. nov. (Figs. 20-23)

Cellulae circiter tam longae quam latae sunt, in visu frontali habent sex processus brachiales. Sinus exhibet formam litterae V. Corpus semicellulare formam poculi exhibet. In aspectu apicali cellulae triradiatae sunt; semicellulare corpus triangulare est et latera habet circiter tam longa quam unusquisque processuum. Processus exhibent margines paulo undulatas necnon acumina minimis dentibus instructa. In microscopio luminari nulla alia ornamentatio parietis cellulae visibilis est. Cellulae paries magnopere tenuis est. Dimensiones: cellularum longitudine cum brachiis 17-20 µm, sine brachiis 9-12 µm, cellularum latitudine cum brachiis 18-22 µm, isthmi latitudo 3.5-4.5 µm. Typus: Fig. 20.

Cells about as long as broad, in frontal view with six diverging arm-like processes. Sinus v-shaped. Semicell body cup-shaped. Cells in apical view triradiate, the semicell body triangular with sides about as long as each of the processes. Processes with faintly undulating margins and tipped with some minute dents. Light microscopically, no other cell wall ornamentation visible. Cell wall extremely delicate. Dimensions: cell length including processes 17-20 µm, cell length exclusive of processes 9-12 µm, cell breadth including processes 18-22 µm, breadth of isthmus 3.5-4.5 µm. Type: Fig. 20.

Type locality: oligotrophic pool near Winterswijk, sampled on 04-07-1917 (collection no. H366, Amsterdam herbarium).

Distribution: encountered in a few samples from oligotrophic pools near Winterswijk, Boxtel and Ommen, collected by Prof. J. Heimans in the period 1917-1918.

The alga illustrated in our Figs. 20-23 is mainly characterized by its minute cell size in combination with a very delicate cell wall. For this reason it may be overlooked quite readily. Screening the literature for resembling algal forms only *S. paradoxum* forma *parva* W. West was encountered. The description of this taxon (as "var. *parvum* West") in West *et al.* (1923, p. 106, tab. 145: 6) roughly fits that of our alga. However, the original description in West (1892b, p. 182, tab. 23: 12) shows a form distinctly more robust than ours. Apart from this, it is obvious that West's taxon has nothing to do with *S. paradoxum* as conceived elsewhere in the present paper.

Staurastrum obscurum sp. nov. (Figs. 34-42)

Cellulae in aspectu frontali circiter tam longae quam latae sunt, sive paulo longiores quam latae, cum profunda mediana constrictione. Sinus exhibet formam litterae V. Semicellulare habent formam ellipticam vel rhombicam; anguli laterales paulum eminent. Parietes cellularum minimum undulatae sunt, in reliquis aspectibus planae. Cellulae in aspectu apicali quadrangulatae sunt, angulis unius aliaeque cellulae paene alternantibus. Semicellulæ habent cavitates concavos, anguli sunt late rotundi vel paucis

truncati, nonnumquam minime eminentes. Dimensiones: cellularum longitudo 35-39 µm, cellularum latitudo 27-40 µm, isthmi latitudo 10-14 µm. Typus: Fig. 34.

Cells in frontal view about as long as broad or slightly longer than broad, with a deep median constriction. Sinus v-shaped. Semicells elliptic-rhomboid, the lateral angles often slightly produced. Cell wall very faintly undulated, otherwise smooth. Cells in apical view quadrangular, the angles of one semicell more or less alternating with those of the other. Semicells with concave margins, the angles broadly rounded to slightly truncate, sometimes somewhat produced. Dimensions: cell length 35-39 µm, cell breadth 27-40 µm, breadth of isthmus 10-14 µm. Type: Fig. 34.

Type locality: *Sphagnum*-covered spring mire near Brunssum, sampled on 22-08-1974 (collection no. 74.52 Amsterdam herbarium).

Distribution: only known from the type locality where it was still present on 29-09-1990.

With its slightly produced lateral angles the alga under discussion reminds of *S. pachyrhynchum* Nordst. However, it lacks the angular cell wall thickenings most characteristic of the latter species. Moreover, its cell outline is somewhat shivery, not firm as in *S. pachyrhynchum*. Actually, there is more resemblance to *S. punctulatum* Bréh. in Ralfs, particularly its var. *subproductum* W. & G. S. West, except for a complete want of cell wall ornamentation. We checked many tens of cells but none of these showed any cell wall granules. Both in the 1974 and the 1990 sample *S. obscurum* turns out to be a predominant species in an algal assemblage otherwise poor in desmids (both species and specimens). So it is unlikely that we are dealing with an incidental reduction form of *S. punctulatum*.

***Staurastrum paradoxum* Meyen ex Ralfs (Figs. 43-47)**

There is a lot of confusion about the identity of this species. Type material being absent, Brook (1959a, 1959b, 1959c) proposed to abandon this species. According to this author (Brook, 1959b) the figures of *S. paradoxum* in Ralfs (1848, tab. 23: 8a-f) suggest it to be a reduced form of *S. anatinum* Cooke & Wills whereas most of the figures in more recent publications referred to *S. paradoxum* can be assigned to other well-defined taxa, like *S. chaetoceras* (Schröd.) G.M. Smith and *S. cingulum* (W. & G. S. West) G.M. Smith. No doubt, most of this confusion is brought about by the well-known manual by West *et al.* (1923), up to now acting as the only more or less critical desmid flora covering the genus *Staurastrum*. Unfortunately, the figures presented under the name of *S. paradoxum* (West *et al.*, 1923, tab. 145: 1-10) obviously refer to a number of different species. Even when considering only the nominal variety of *S. paradoxum* (West *et al.*, 1923, tab. 145: 1-5) it is clear that at least two species are at issue. The one figured in tab. 145: 5 most probably is to be identified with *S. chaetoceras*. The figures in tab. 145: 1-4, on the other hand, could be assigned to *S. paradoxum* as originally described in Ralfs (*loc. cit.*). I disagree with Brook (*loc. cit.*) in considering this alga a reduced form of *S. anatinum*. *S. anatinum* as well as the closely related *S. vestitum* differ from *S. paradoxum* not only in a more pronounced cell wall ornamentation but also in a lower cell length : breadth ratio, mainly caused by a more parallel position of the cell processes (compare Figs. 9 and 10 with Figs. 43-47). Moreover, there is a difference in ecology, *S. paradoxum* being encountered in distinctly acid, dystrophic pools as against *S. anatinum* and *S. vestitum* in but slightly acid, oligo-mesotrophic habitats. So, to my mind *S. paradoxum* is a well-defined species, readily to be distinguished from all taxa it has been mixed up.

***Staurastrum paradoxum* Meyen ex Ralfs var. *reductum* var. nov. (Figs. 48-51)**

Var. reductum differt a varietate eponymica processibus paene omnino reductis. Typus: Fig. 51.

Var. reductum differs from the nominal variety by almost completely reduced processes. This algal form was dealt with by Förster (1970, p. 340, tab. 28: 20) under the name of *S. polymorphum* Bréb. var. *pygmaeum* Grönbl., and also (Förster 1970, p. 339, tab. 28: 26-27) under the name of *S. paradoxum* "formae processibus reductis". Since I have the impression that it does concern a genetically fixed form it is made a taxon on its own.

Whereas, in The Netherlands, the nominal variety of *S. paradoxum* is rather widely distributed in dystrophic pools and peat pits, var. *reductum* is only known from some pools near Dwingelo.

***Staurastrum simonyi* Heimerl var. *semicirculare* var. nov. (Figs. 27, 28)**

Var. semicirculare differt a varietate eponymica semicirculari forma semicellulae, non elliptica, necnon deminutio magnitudinis ac numeri spinarum in semicellulae apice et angulis. Typus: Fig. 28.

Var. semicirculare differs from the nominal variety by a semicircular instead of ellipsoid shape of the semicell, and by a reduction in size and number of the spines at the semicell apex and angles.

This algal form was previously (Coesel & Kooijman-Van Blokland, 1976, p. 65, fig. 1e) presented under the name of *S. urnelli* Boldt var. *spiniferum* W. & G. S. West. However, our Figs. 27-28 in combination with Figs. 29-30 show its relationship to *S. simonyi*. For morphological variability in *S. simonyi*, see also Kouwets (1988, p. 303, tab. 5: 1-12).

In The Netherlands, both the nominal variety of *S. simonyi* and its var. *semicirculare* are not rare in oligotrophic moorland pools.

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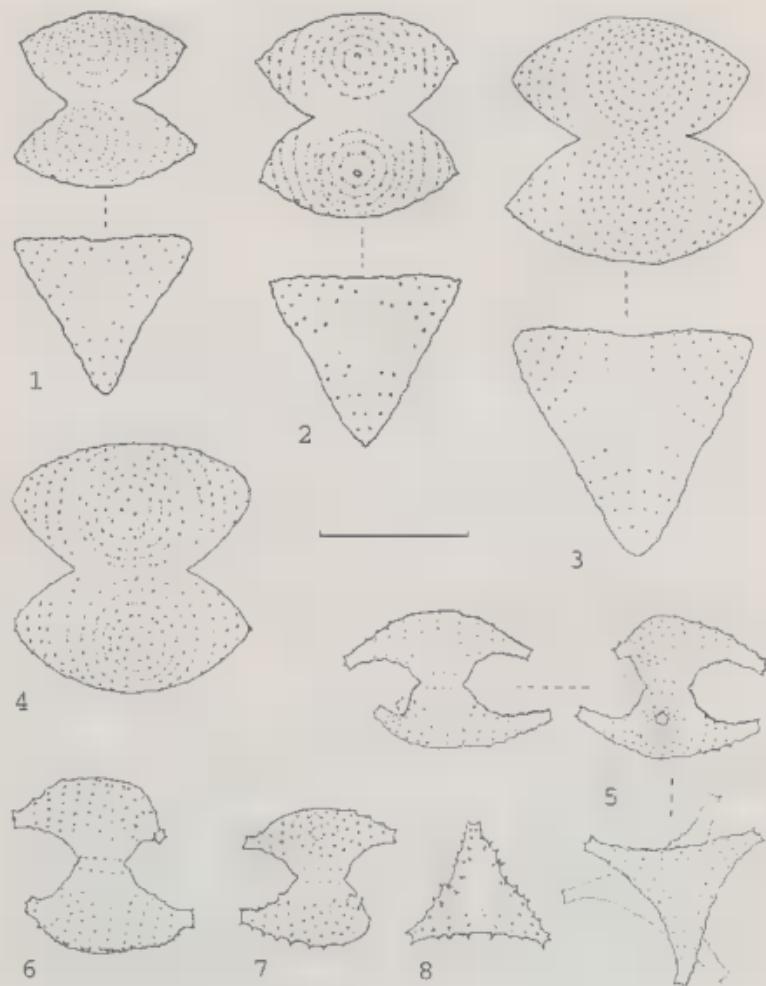


Fig. 1. *Staurastrum acutum* var. *acutum*. Fig. 2. *S. acutum* var. *paxilliferum*. Figs. 3-4. *S. acutum* var. *badense*. Fig. 5. *S. inflexum* var. *inflexum*. Figs. 6-8. *S. inflexum* var. *brachycerum*. (Figs. 6-8 after Joosten, archive). Scale bar = 25 μm .

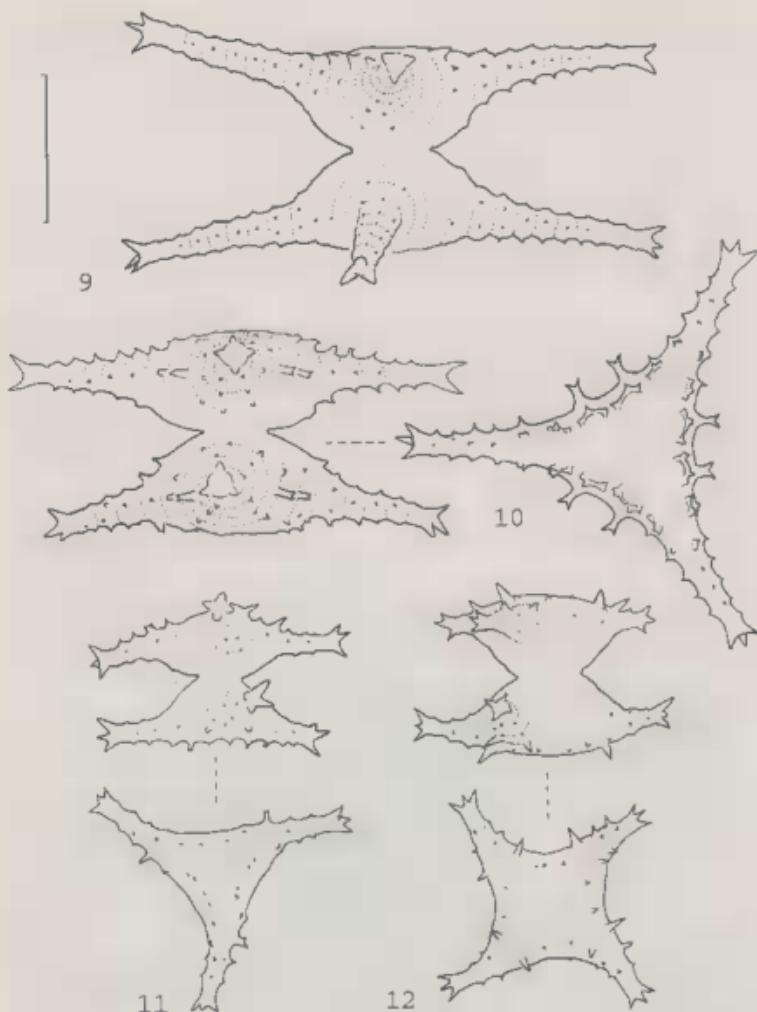


Fig. 9. *Staurastrum anatinum*. Fig. 10. *S. vestitum*. Fig. 11. *S. controversum* var. *semivestitum*.
Fig. 12. *S. controversum* var. *controversum*. Scale bar = 25 μm .

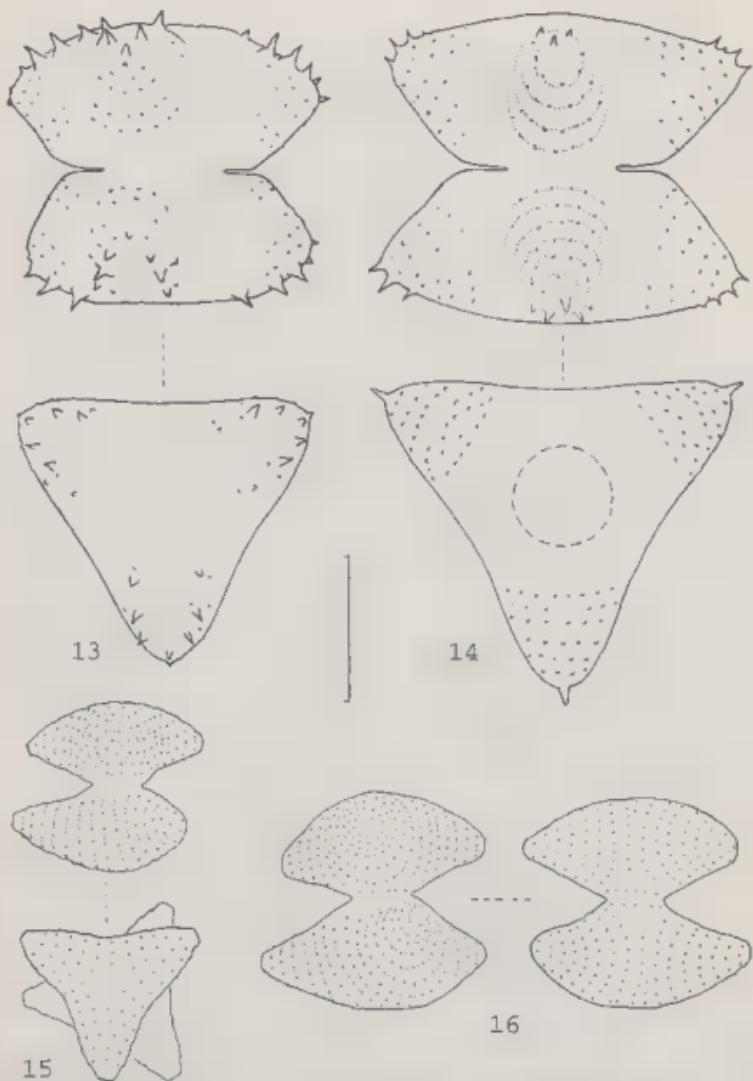


Fig. 13. *Staurastrum cristatum* var. *cuneatum*. Fig. 14. *S. cristatum* var. *navigiolum*. Fig. 15. *S. dispar* var. *dispar*. Fig. 16. *S. dispar* var. *semicirculare*. Scale bar = 25 µm.

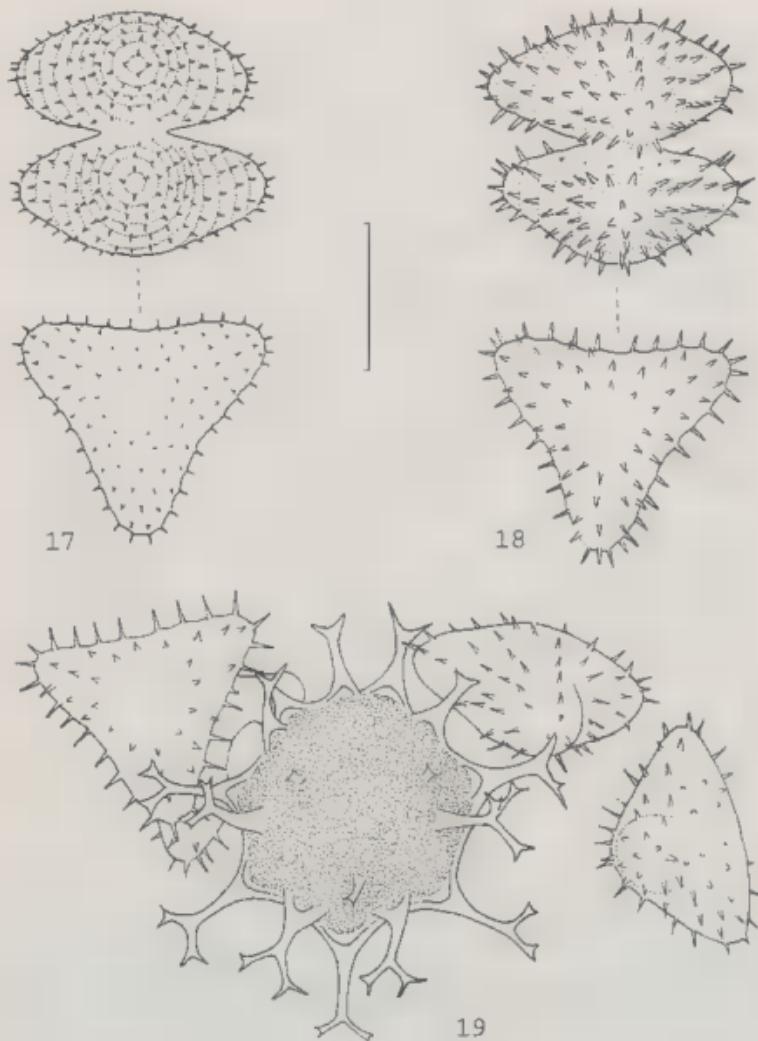
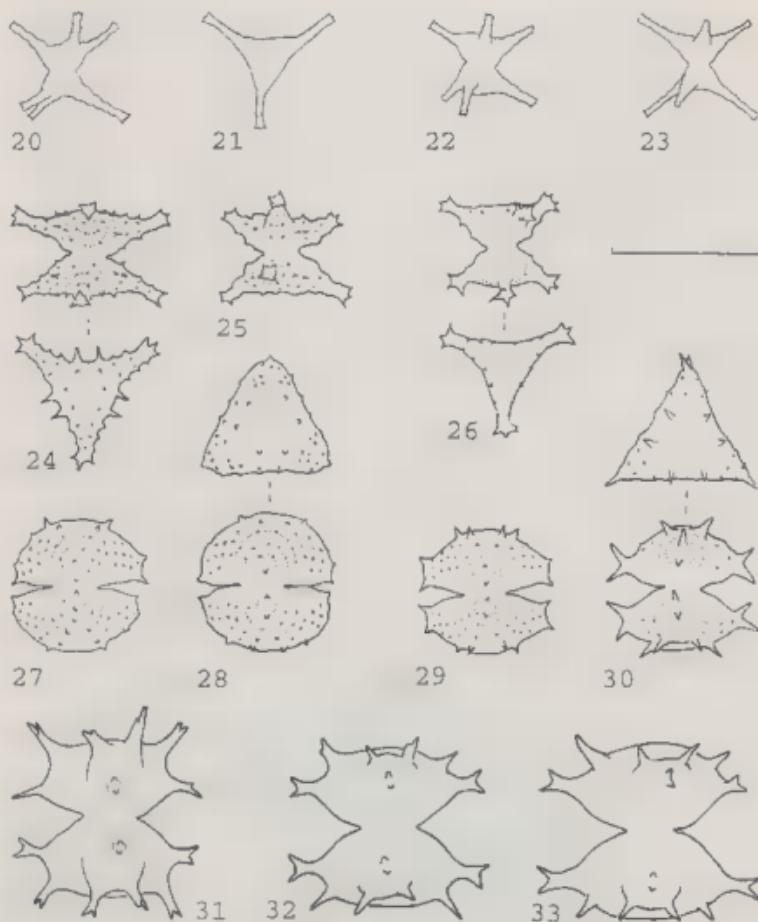
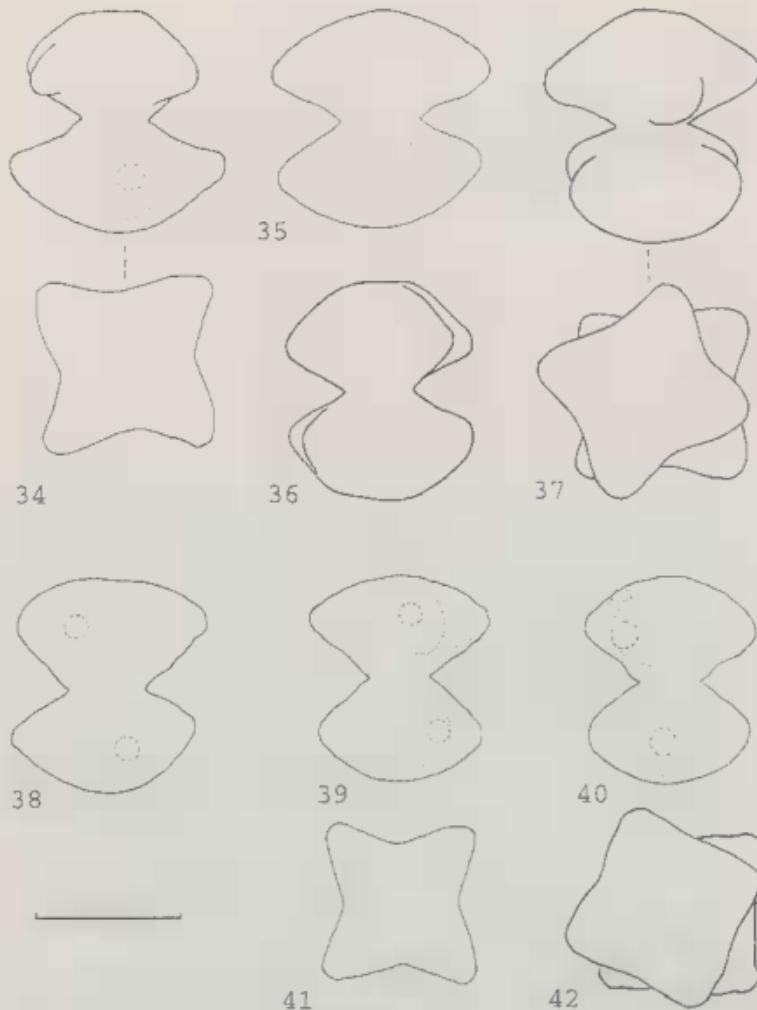


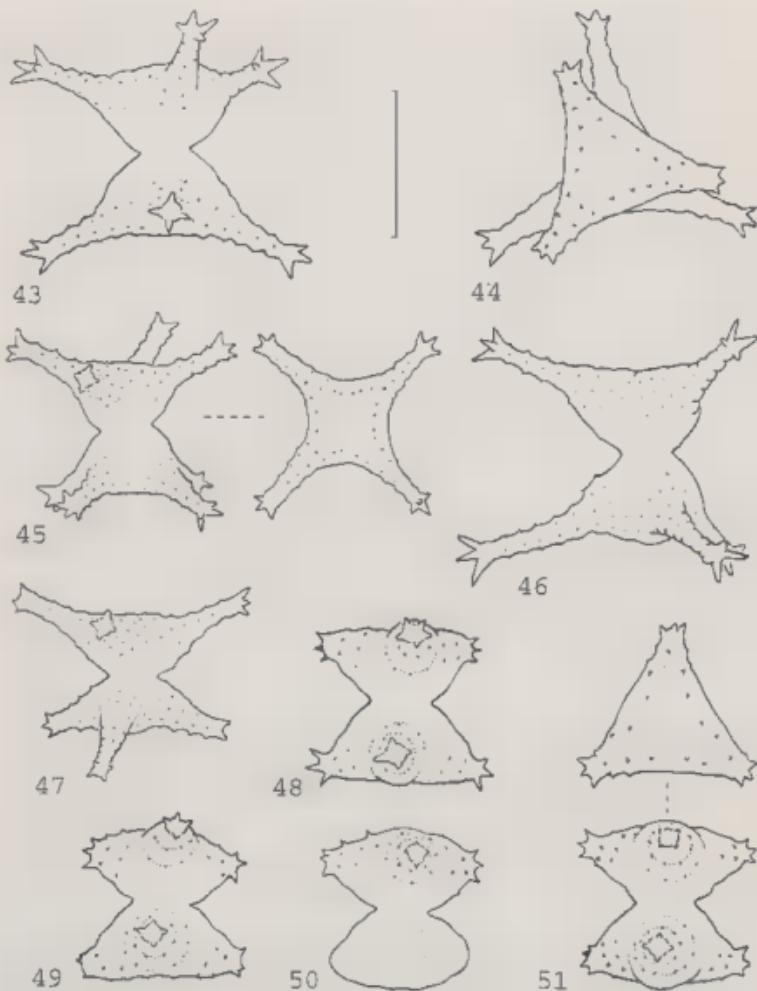
Fig. 17. *Staurastrum brebissonii*. Figs. 18-19. *S. kouwetsii*. Scale bar = 25 µm.



Figs. 20-23. *Staurastrum minimum*. Figs. 24-25. *S. micron* var. *spinulosum*. Fig. 26. *S. micron* var. *micron*. Figs. 27-28. *S. simonyi* var. *semicirculare*. Figs. 29-30. *S. simonyi* var. *simonyi*. Fig. 31. *S. furcatum* var. *furecatum*. Figs. 32-33. *S. furcatum* var. *aculeiferum*. Scale bar = 25 μm .



Figs. 34-42. *Staurastrum obscurum*. (Figs. 39-42 after Joosten, archive). Scale bar = 25 μm .



Figs. 43-47. *Staurastrum paradoxum* var. *paradoxum*. Figs. 48-51. *S. paradoxum* var. *reductum*.
Scale bar = 25 µm.